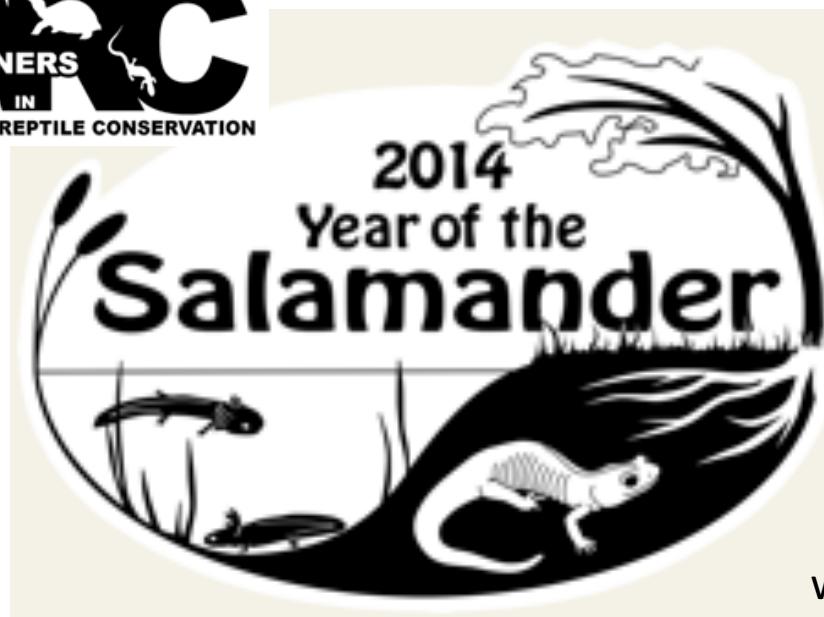


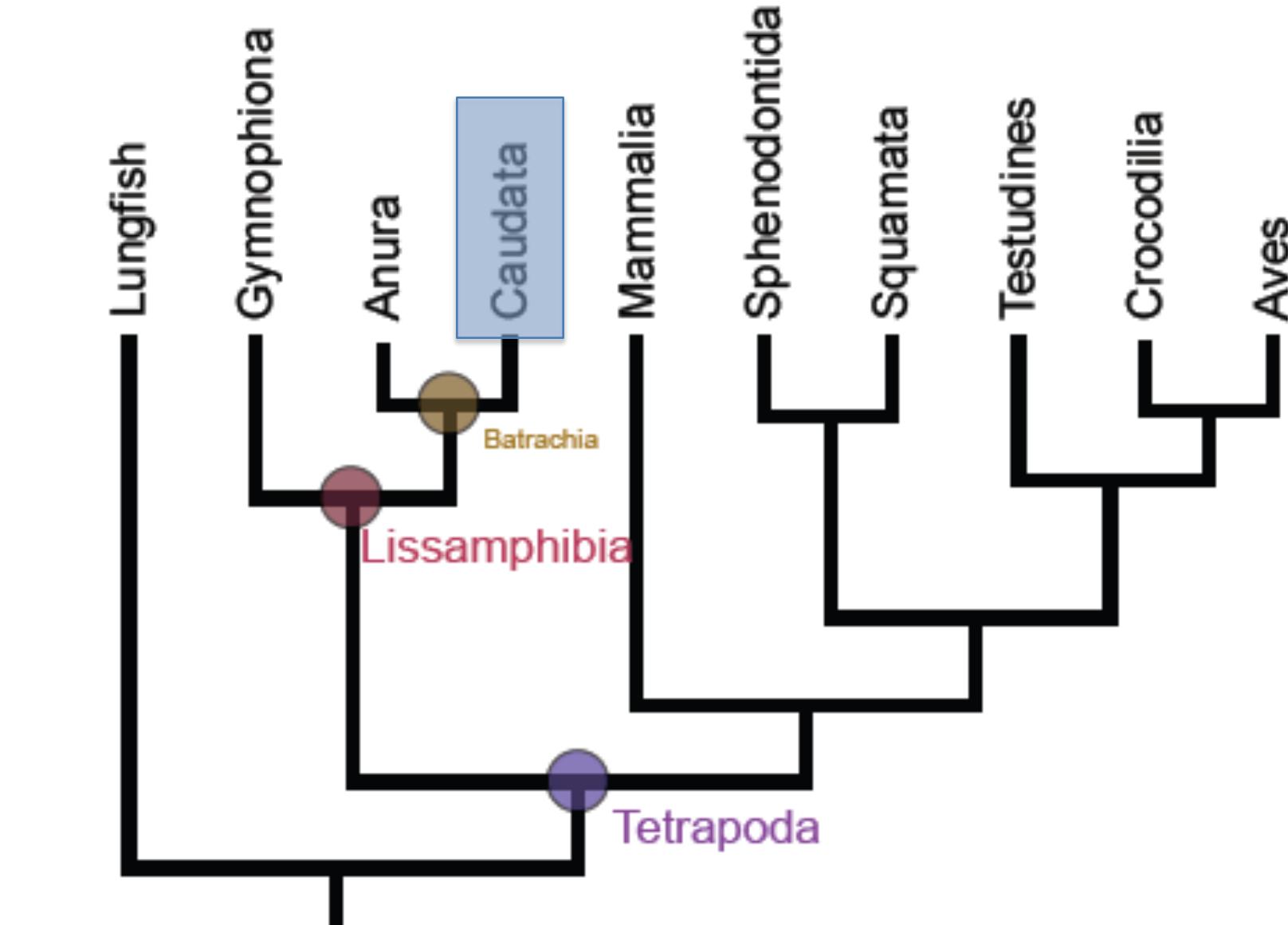


salamander Diversity



www.parcplace.org

Systematics of living “herps”

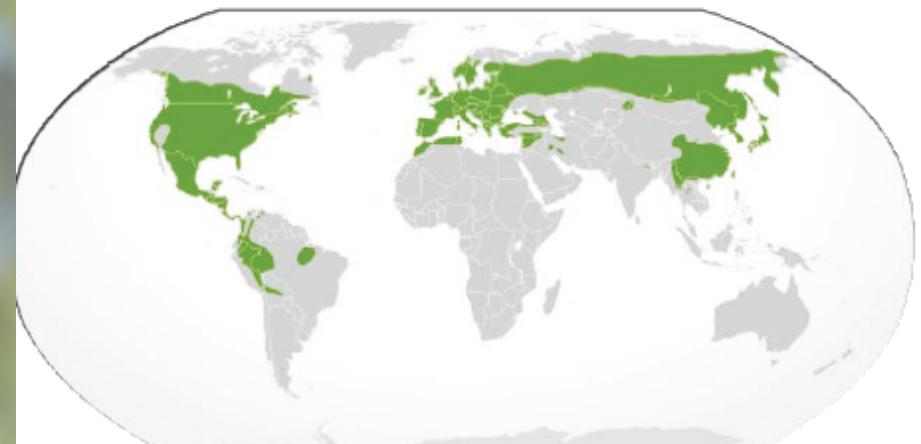


- 
- 10 Families
 - 67 Genera
 - 668 Species (as of 9/9/14)

J. Uyeda

Order: Caudata

~ 9% of Amphibian diversity



- Holoarctic distribution
- Mostly temperate and subtropical
- MOIST habitats

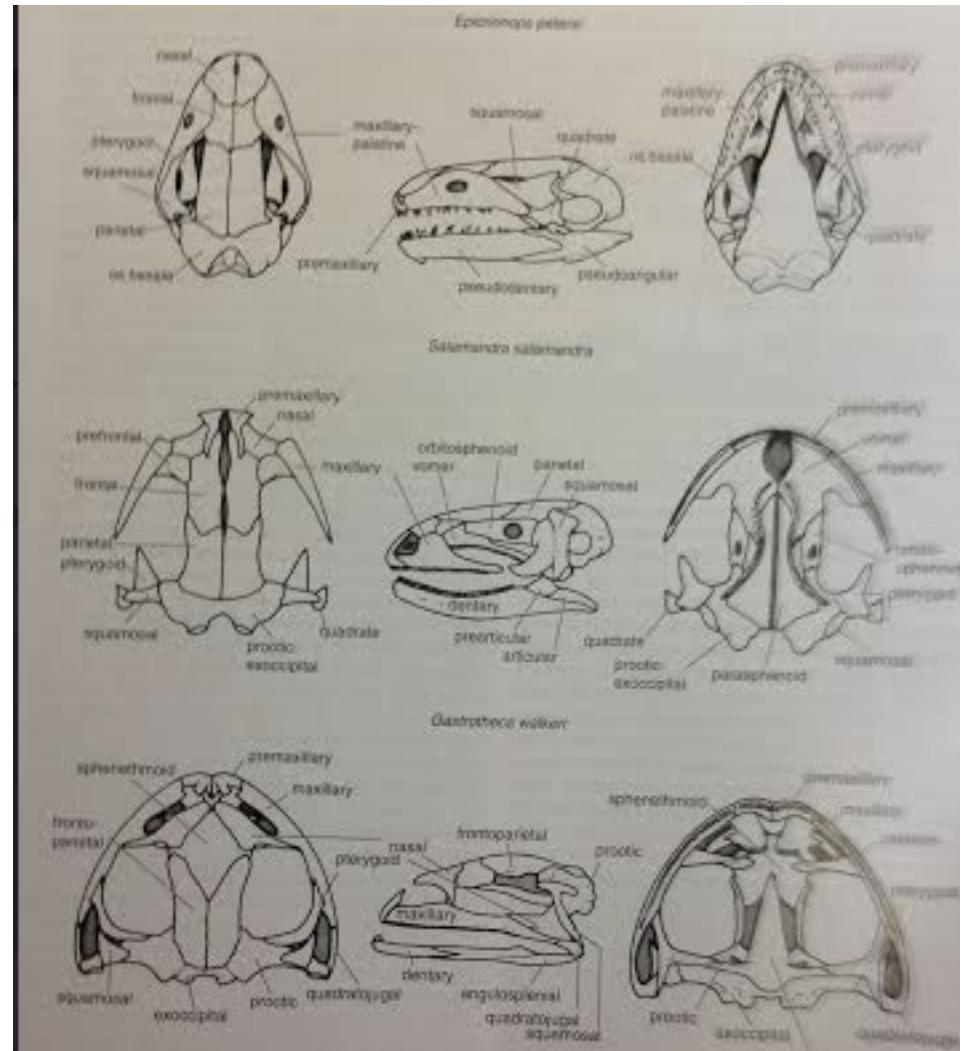
Diagnostic Characteristics

- Distinct Head, Trunk, and Tail
- Four limbs; Hind limbs not larger than forelimbs (*may be reduced or absent in some spp)
- Toes WITHOUT claws



Diagnostic Characteristics

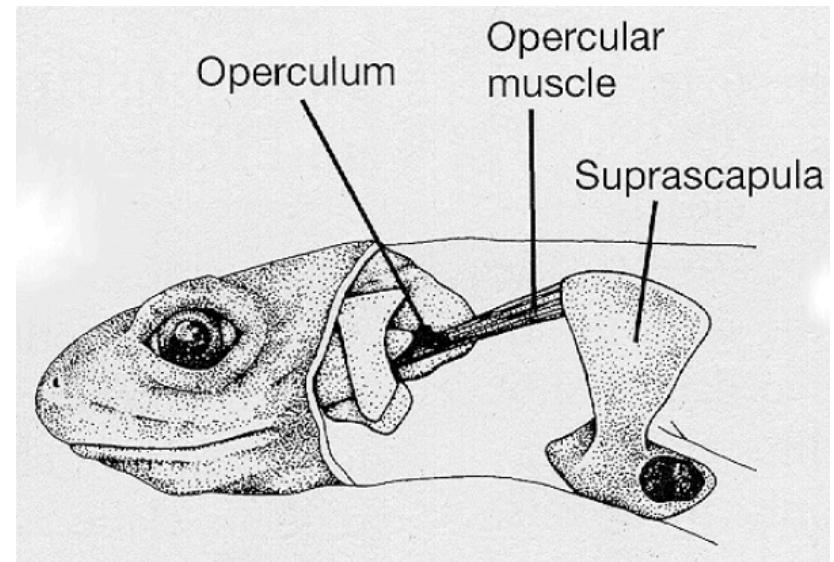
- **Loss of bones** in the skull (many cartilaginous elements)
- Lack middle ear cavities and tympana
- Sternum present



Duellman and Trueb 1986

Diagnostic Characteristics

- Loss of bones in the skull
- Lack middle ear cavities and tympana
- Sternum present



Pough et al. 2004

Diagnostic Characteristics

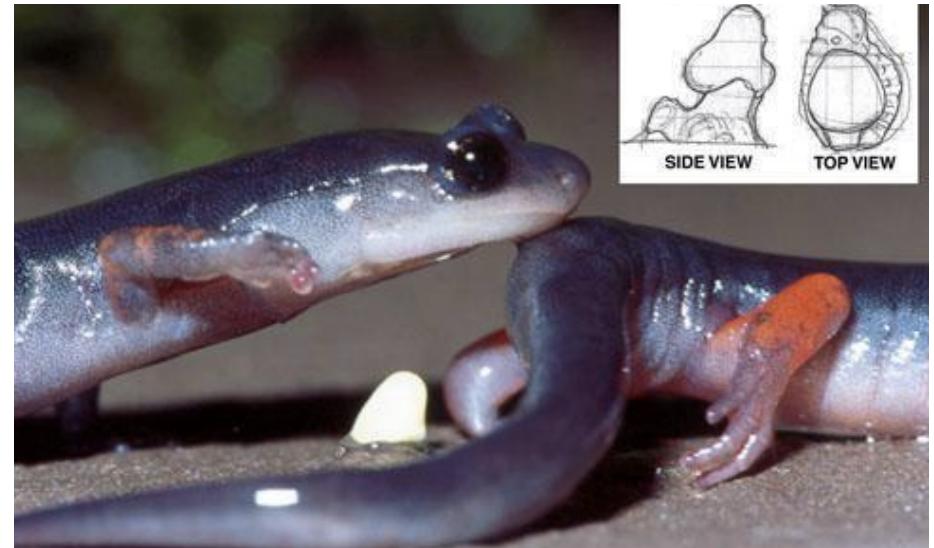
- Mucus and poison glands in skin – aggregations called **COURTSHIP GLANDS**



© Gary Nafis

Diagnostic Characteristics

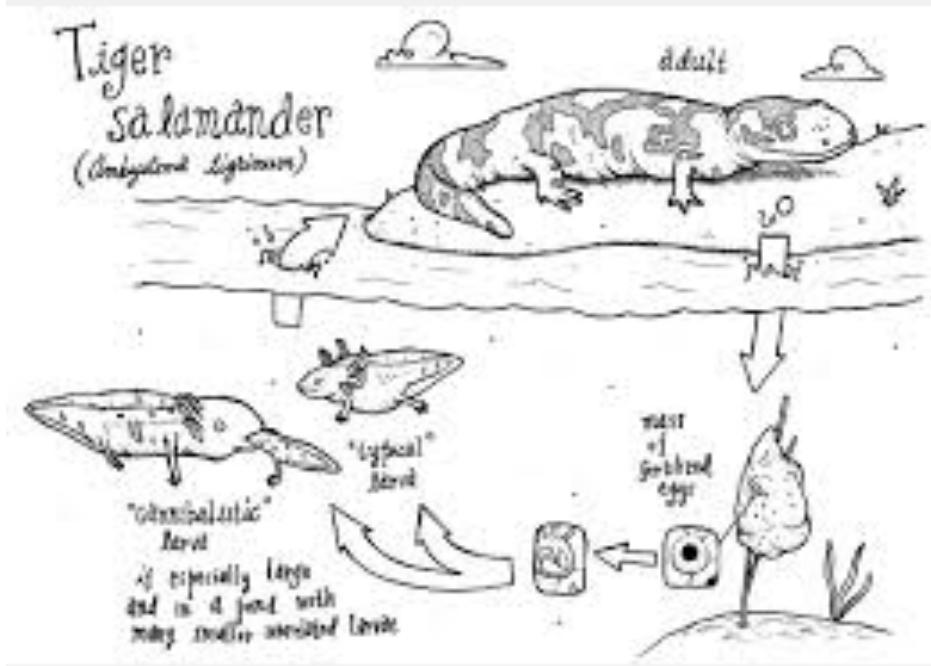
- Derived lineages have internal Fertilization **via SPERMATOPHORE (>90%)**



Plethodon.science.oregonstate.edu

Diagnostic Characteristics

- Development:
 - Primarily EXTERNAL
 - Larval Stage (ancestral)
 - Direct Development (> 300 spp of Plethodontids)



Diagnostic Characteristics

- Development:
 - Primarily EXTERNAL
 - Larval Stage (ancestral)
 - Direct Development (> 300 spp of Plethodontids)
- Larvae with true teeth, bony skeleton, different palate, gill slits or external gills



Paedomorphosis

Attaining Reproductive Maturity While Retaining the Larval External Morphology



Page 9, Behler and King, 1988

- Cryptobrachidae
- Sirenidae
- Amphiumidae
- Proteidae
- Hynobiidae
- Salamandridae
- Ambystomatidae
- Dicamptodontidae
- Plethodontidae

Paedomorphosis

- **Neoteny** = Slowed somatic growth
- **Progenesis** = Increased gonadal growth

Caudata clades

- Ambystomatidae
- Amphiumidae
- Cryptobranchidae
- Dicamptodontidae
- Hynobiidae
- Plethodontidae
- Proteidae
- Rhyacotritonidae
- Salamandridae
- Sirenidae



Class Amphibia (Amphibians)

Order Anura
(Frogs and Toads)

Order Gymnophiona
(Caecilians)

Order Caudata
(Salamanders)

Families

Sirenidae
(Sirens)

Hynobiidae
(Asian Salamanders)

Cryptobranchidae
(Giant Salamanders)

PARC
PARTNERS
IN
AMPHIBIAN AND REPTILE CONSERVATION



Ambystomatidae
(Mole Salamanders)



Dicamptodontidae
(Pacific Giant Salamanders)



Salamandridae
(Newts)



Potamotritonidae
(Waterdogs and Mudpuppies)



Rhyacotritonidae
(Torrent Salamanders)



Amphiumidae
(Amphiumas)

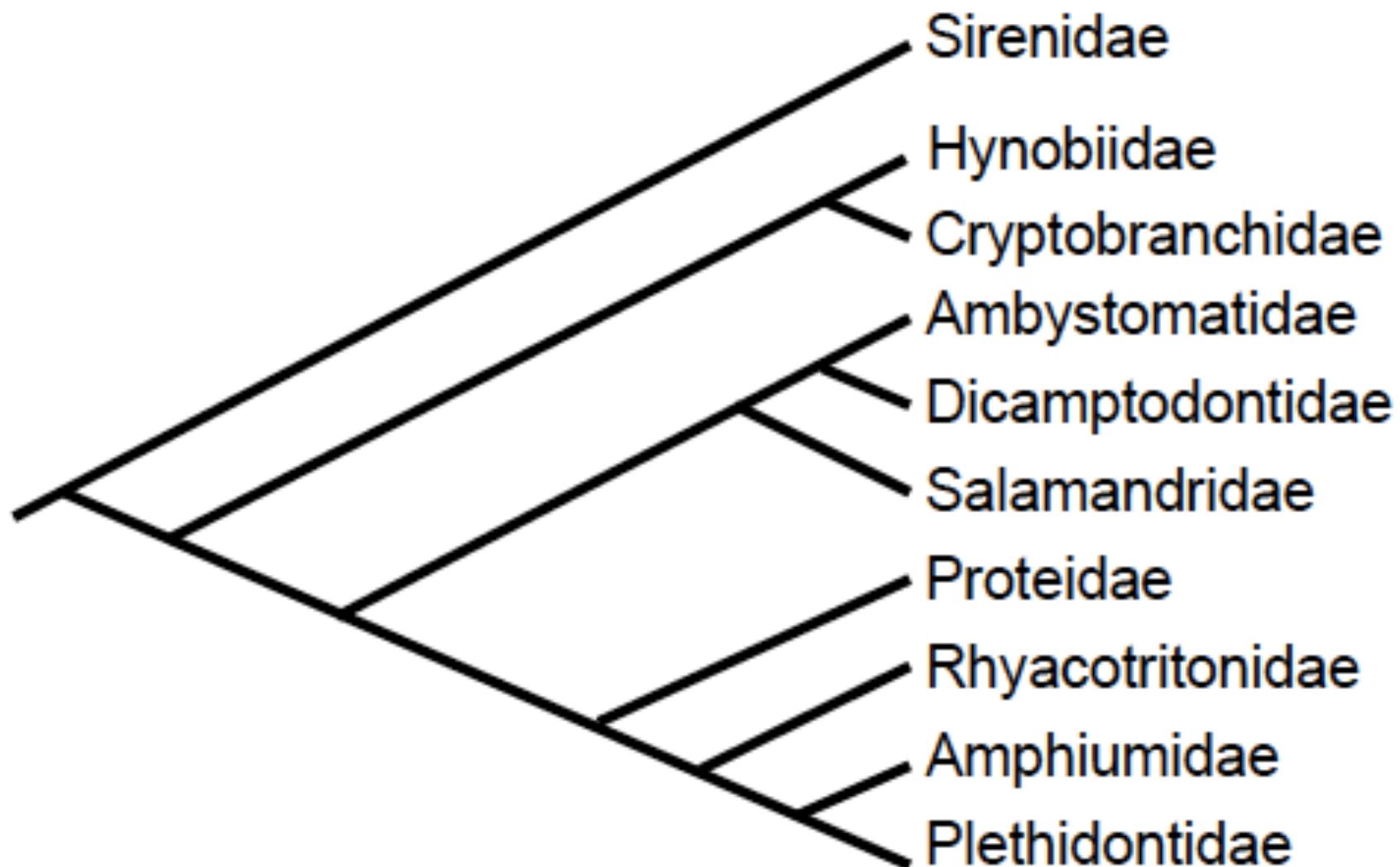


Plethodontidae
(Lungless Salamanders)

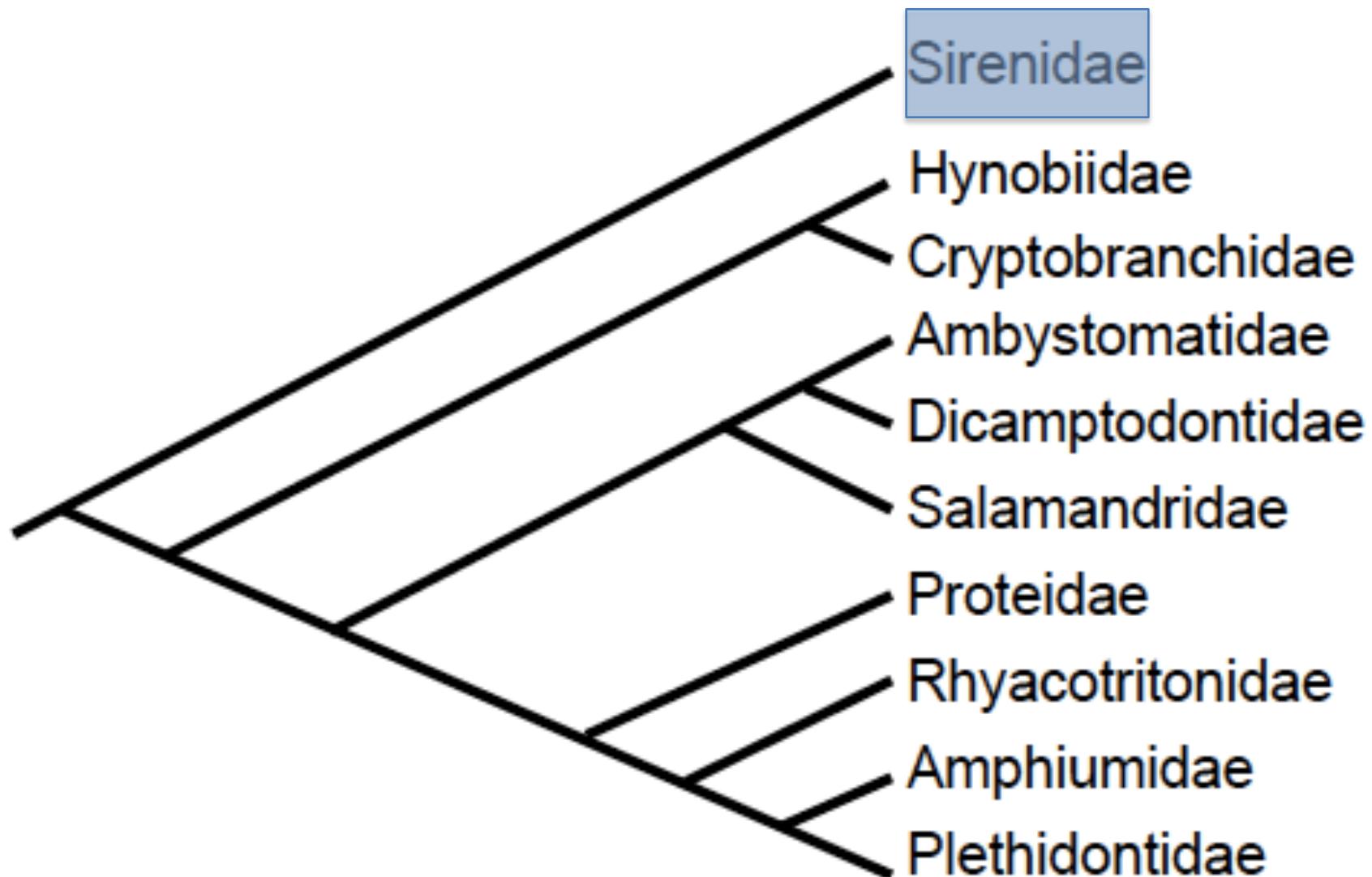


For more information, please visit
www.yearofthesalamander.org

Caudata tree



Caudata tree

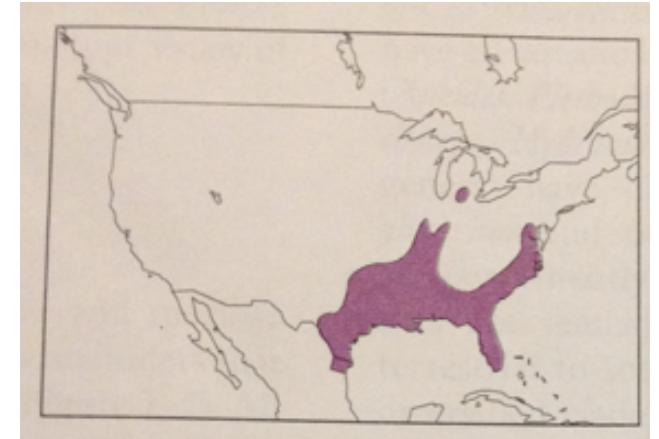


Sirens and Dwarf Sirens

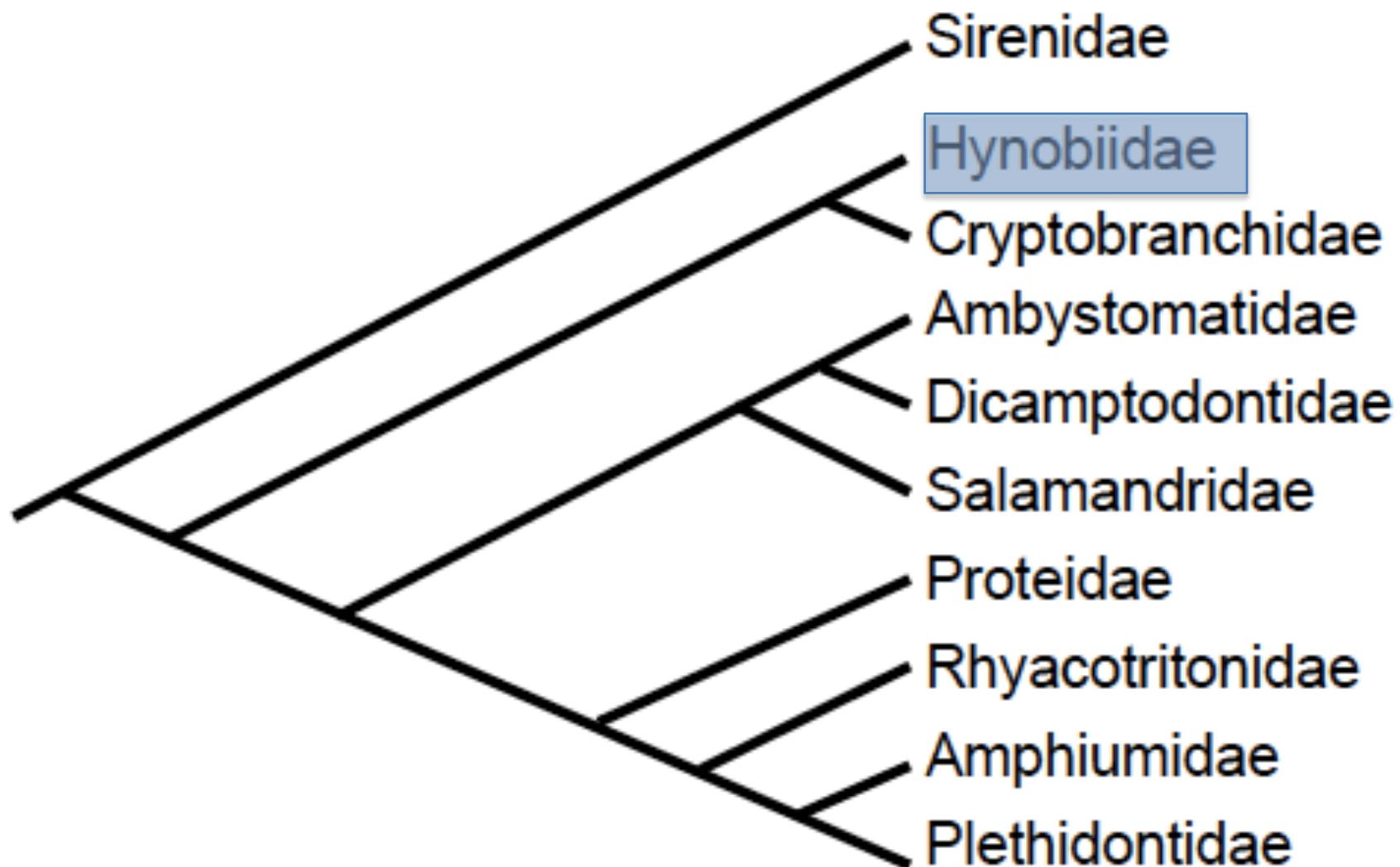
Clade: Sirenidae

2 Genera, 4 Species

- Pelvic girdle and hindlimbs **ABSENT**
- **Adults: 10 – 90 cm TL**
- Keratinized beak
- Costal grooves ABOVE ribs
- **PAEDOMORPHIC FEATURES:**
 - NO eyelids
 - Gills and Gill slits
 - Tail fin
 - Fewer digits



Caudata tree



Asiatic Salamanders

Clade: Hynobiidae

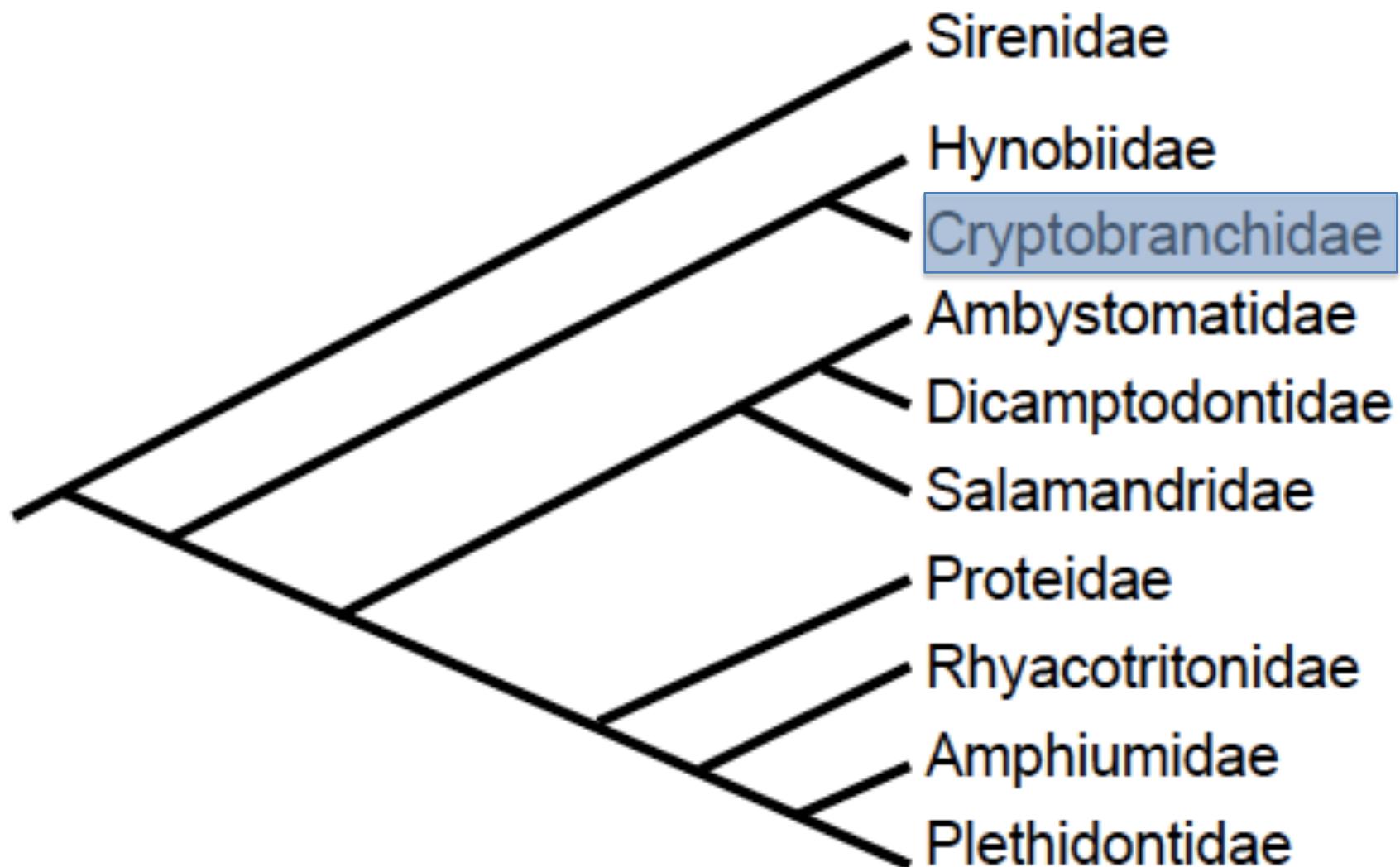
9 Genera, 62 Species

- MOST are small (< 10cm TL)

- Complete Metamorphosis
 - Eyelids
 - Well Developed Lungs and Lack of Gill Slits (Adults)
- Adults Terrestrial
- External Fertilization
 - Spermatophore (*Ranodon sibericus*)



Caudata tree



Giant Salamanders

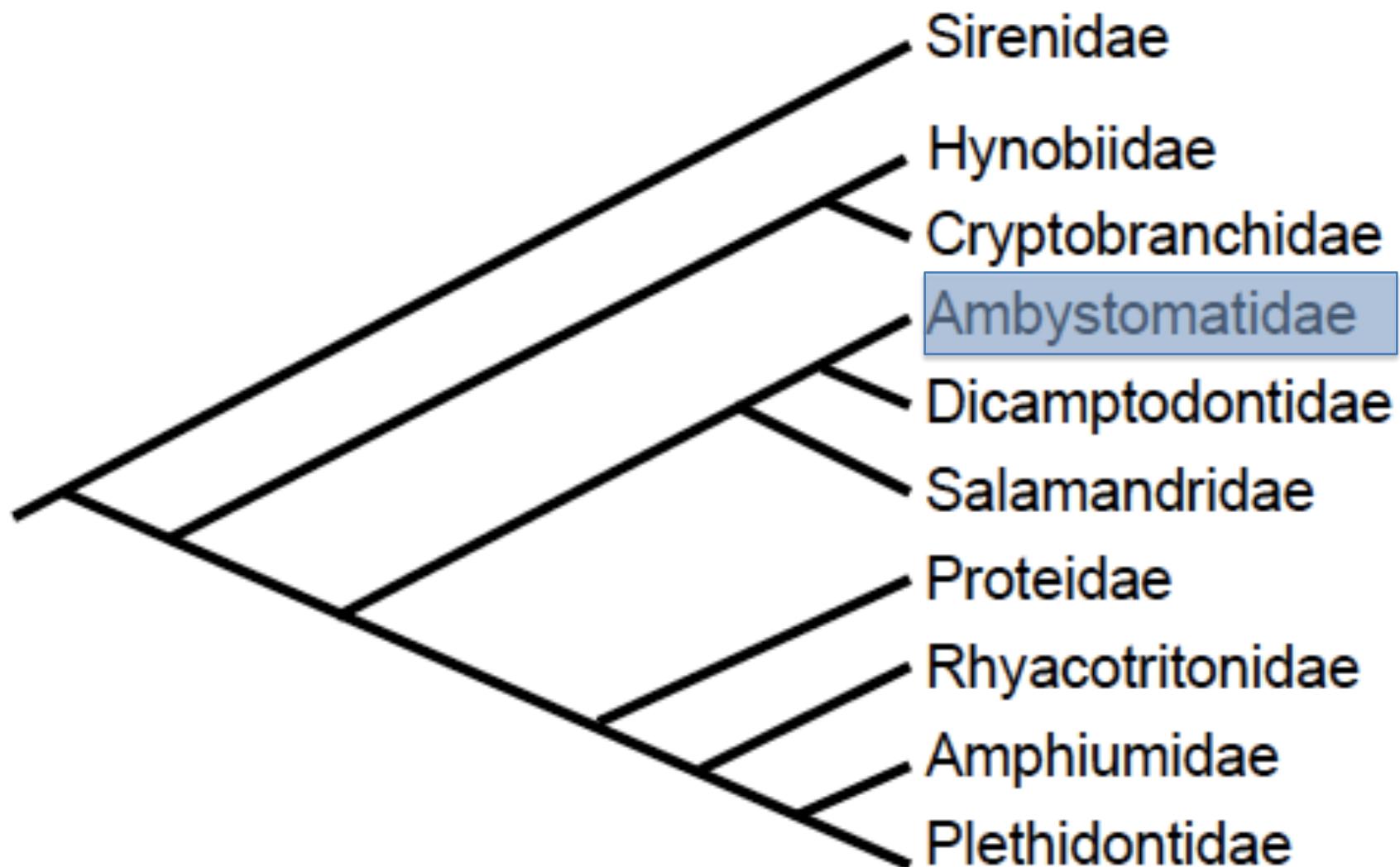
Clade: Cryptobranchidae

2 Genera, 3 Species

- EXTERNAL fertilization
- LARGEST living salamanders
- Fleshy skin folds
- Laterally compressed tail
- PAEDOMORPHIC FEATURES:
 - NO eyelids
 - ONE pair of gill slits
 - Tail fin
 - NO tongue pad



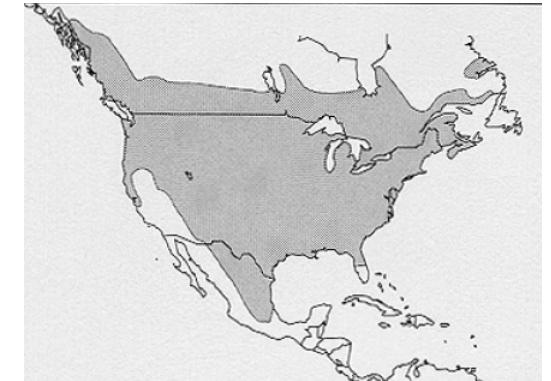
Caudata tree



Mole Salamanders

Clade: Ambystomatidae

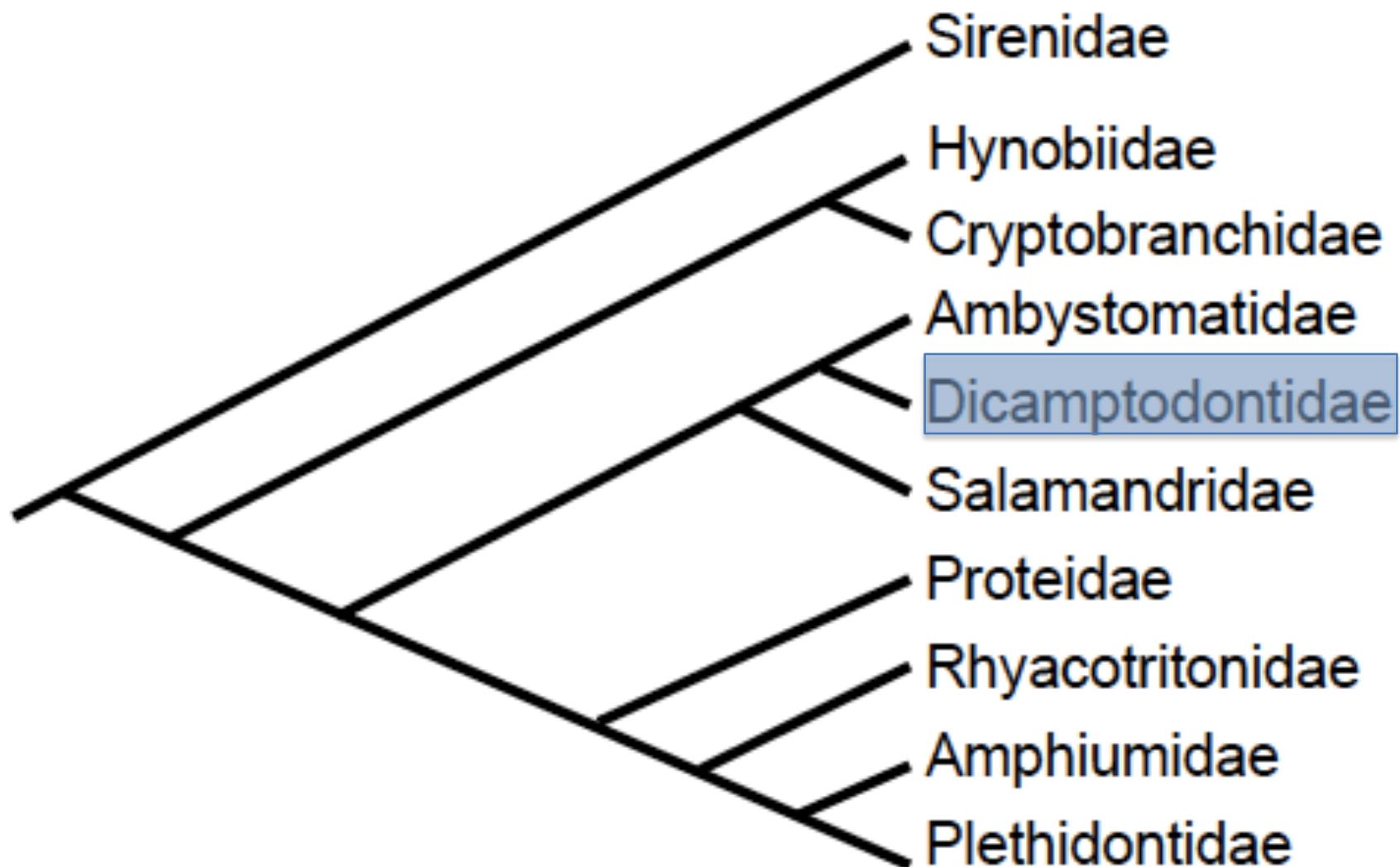
1 Genus, 32 Species



- Fossorial
- Hefty
- Facultative or obligate metamorphosis
- Tubercles
- Costal grooves
- Cloacal glands



Caudata tree



Pacific Giant Salamanders

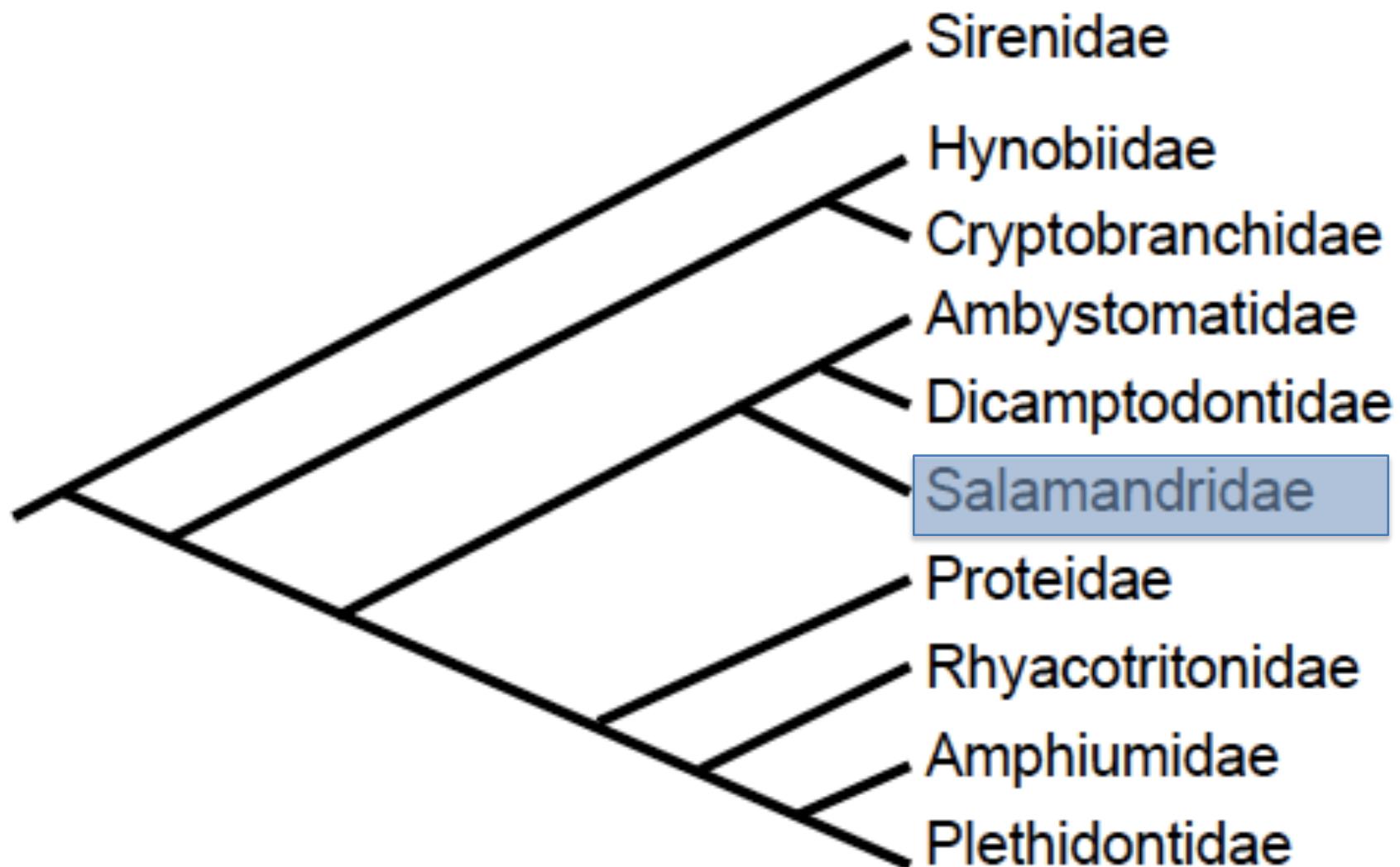
Clade: Dicamptodontidae

1 Genus, 4 Species

- Often paedomorphic (obligate in *D. copei*)
- Inhabit cold streams
- NO tubercles
- Less distinct costal grooves



Caudata tree



Newts, Brook and Fire Salamanders



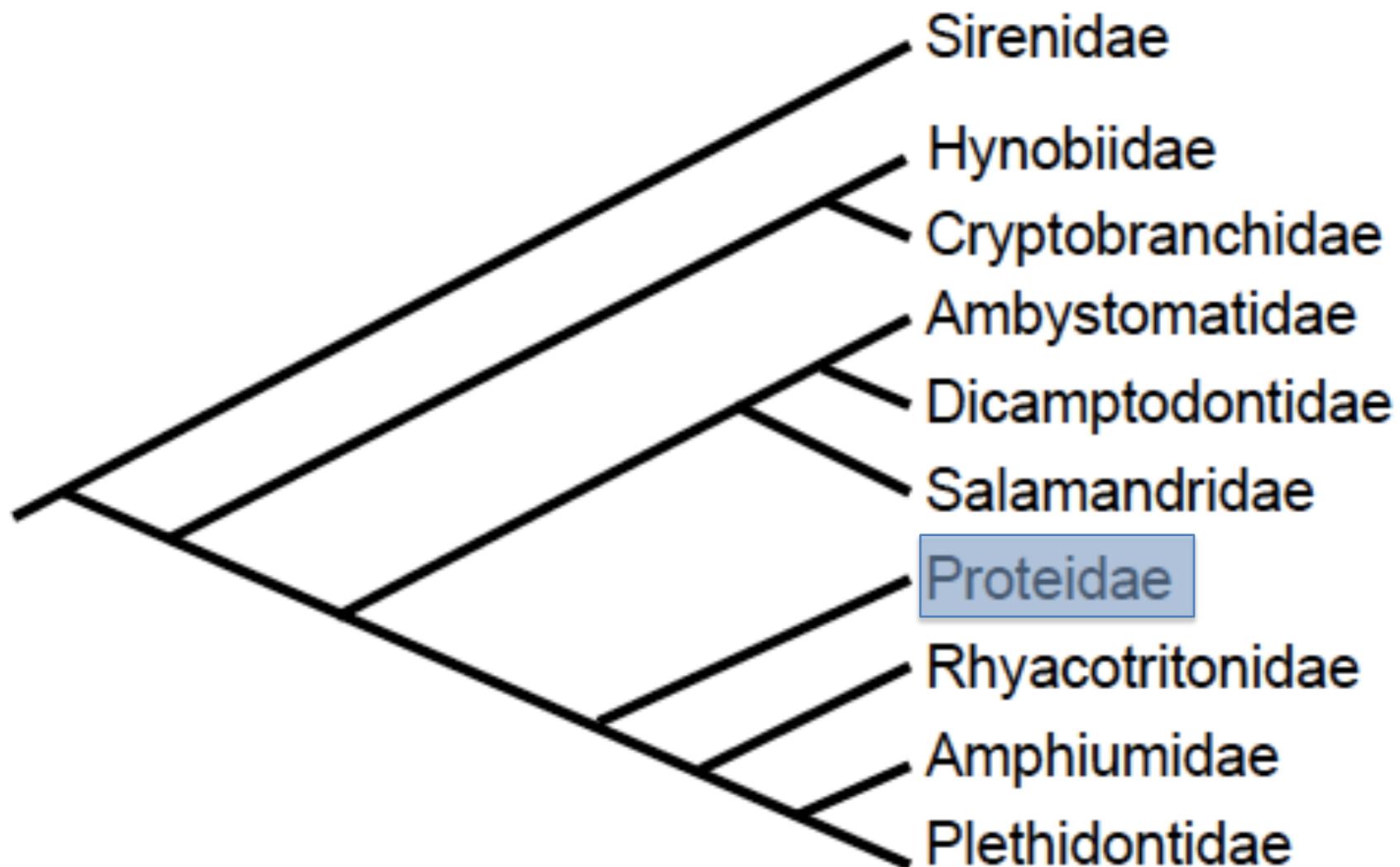
Clade: Salamandridae

21 Genera, 107 Species

- Rough Skin
- Toxic Secretions
- **APOSMATIC** Coloration
- NO costal grooves



Caudata tree

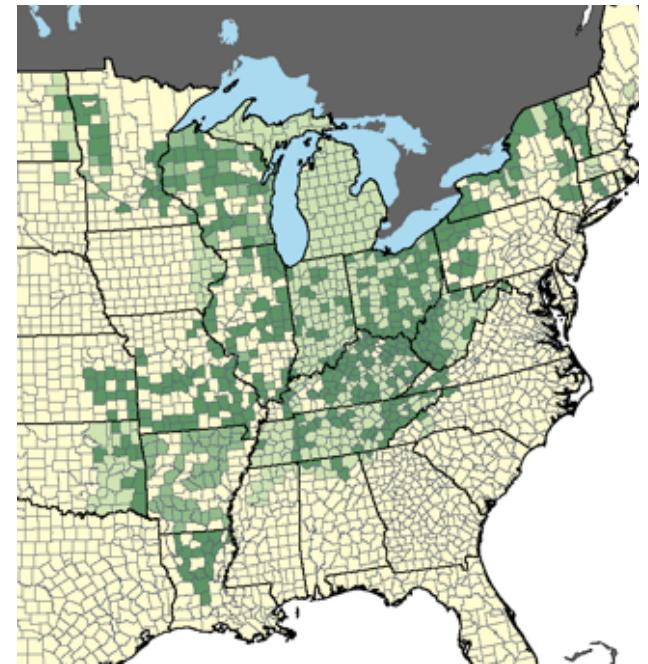


Olm, Mudpuppy, and Waterdog

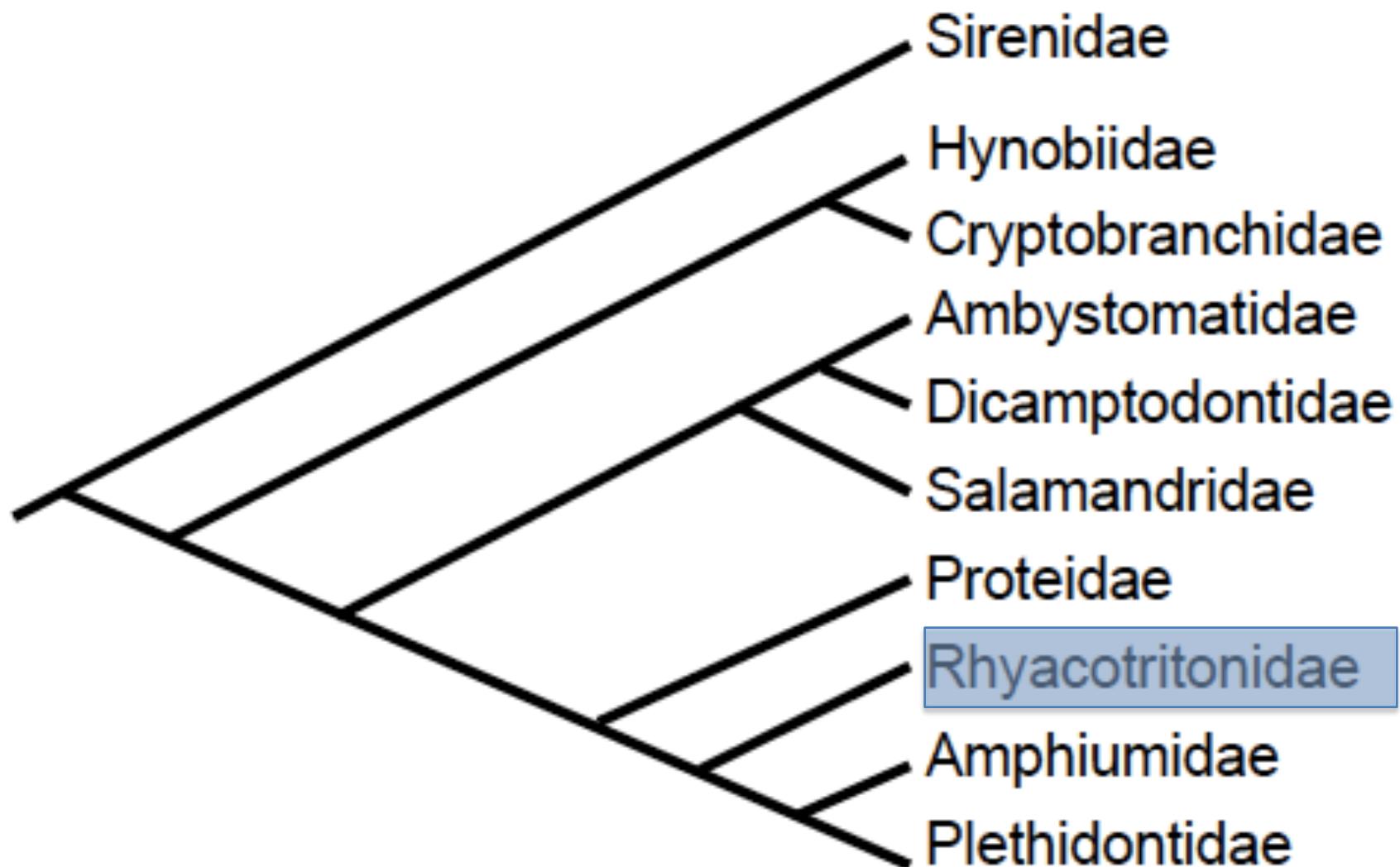
Clade: Proteidae

2 Genera, 6 Species

- Aquatic
- Nasals absent
- Laterally compressed tails
- Reduced number of toes
- PAEDOMORPHIC CHARACTERS:
 - LARGE Gills
 - Caudal fins
 - 4 toes on hind feet
 - Weak costal grooves
 - No eyelids



Caudata tree



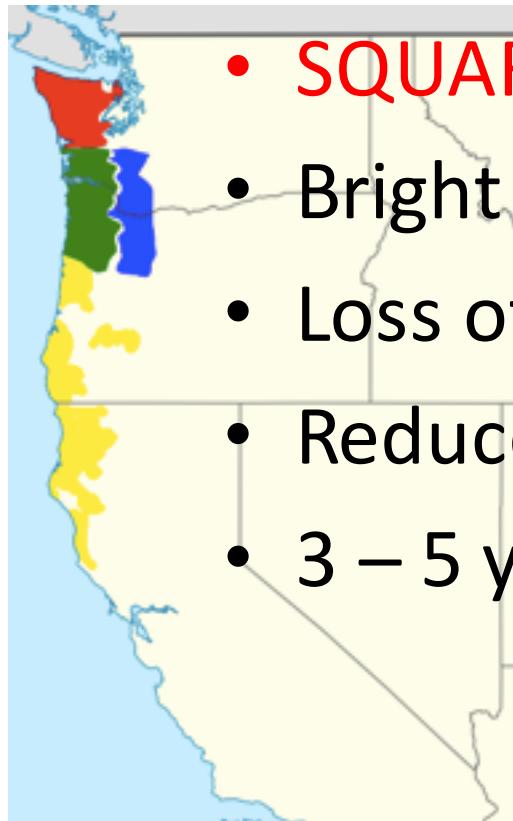
~~Urotritons (sensu stricto)~~

Salamanders

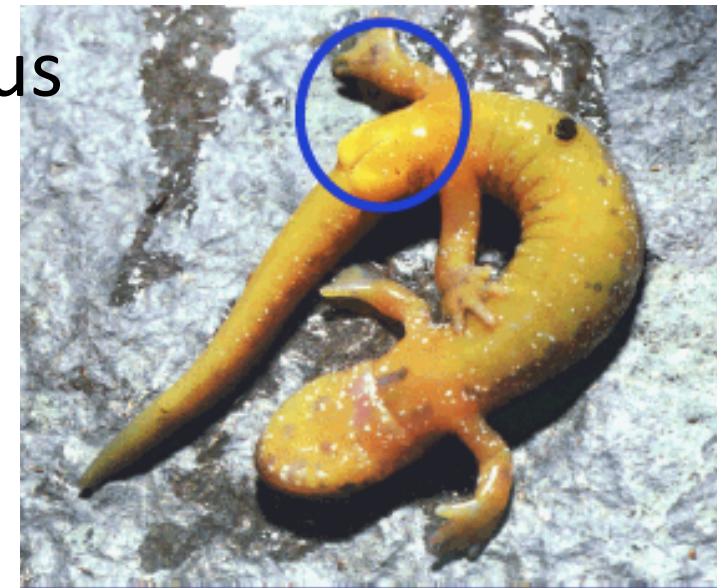
Clade:

Rhyacotritonidae

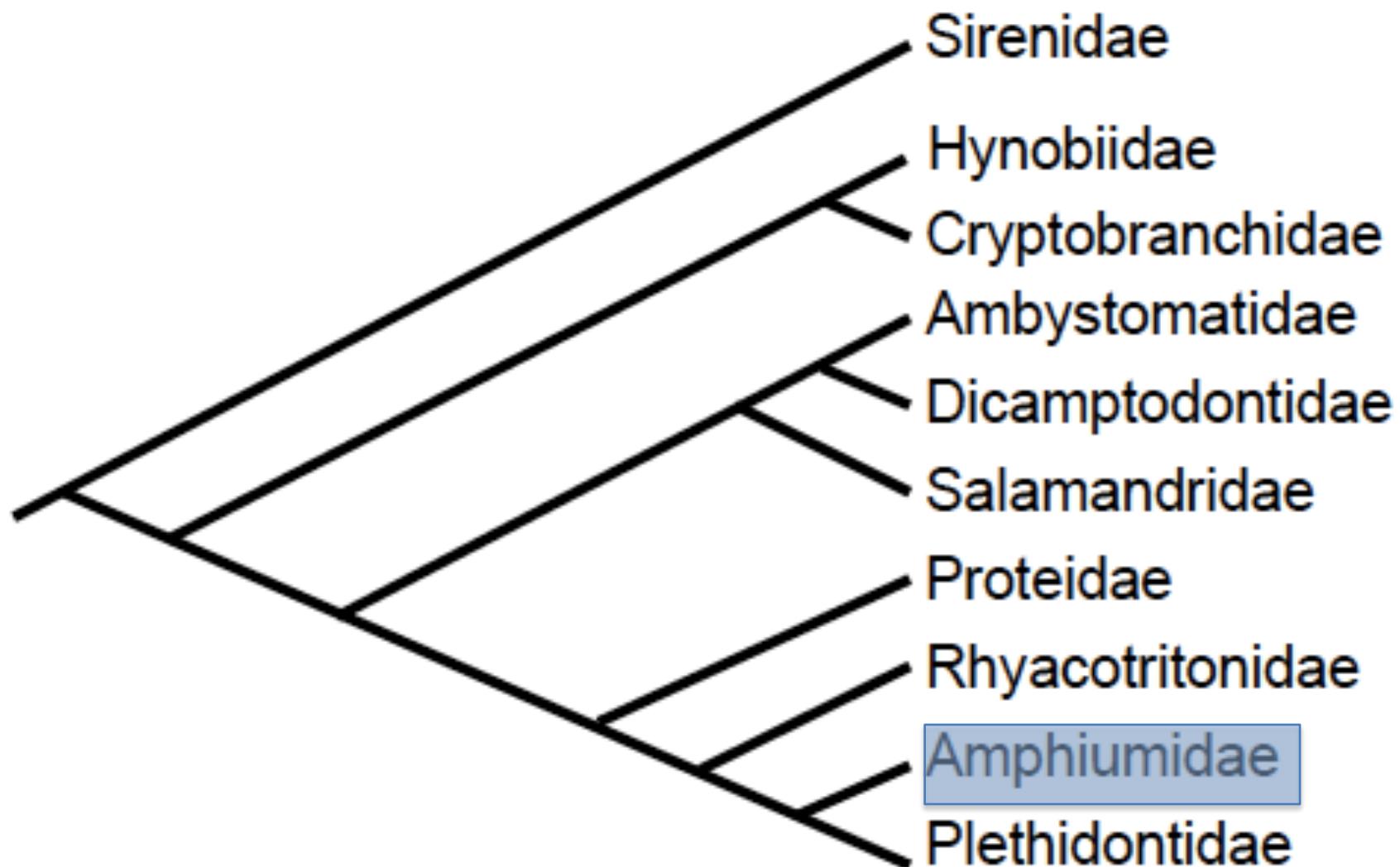
1 Genus, 4 Species



- **SQUARED** Gland posterior to vent
- Bright **YELLOW** ventral coloration
- Loss of opercular apparatus
- Reduced lungs
- 3 – 5 year larval stage



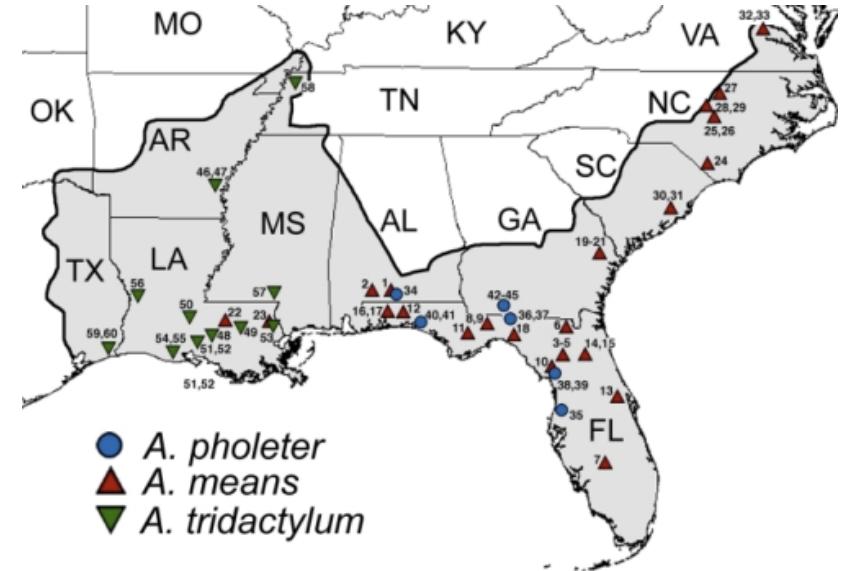
Caudata tree



Amphiumas

Clade: Amphiumidae

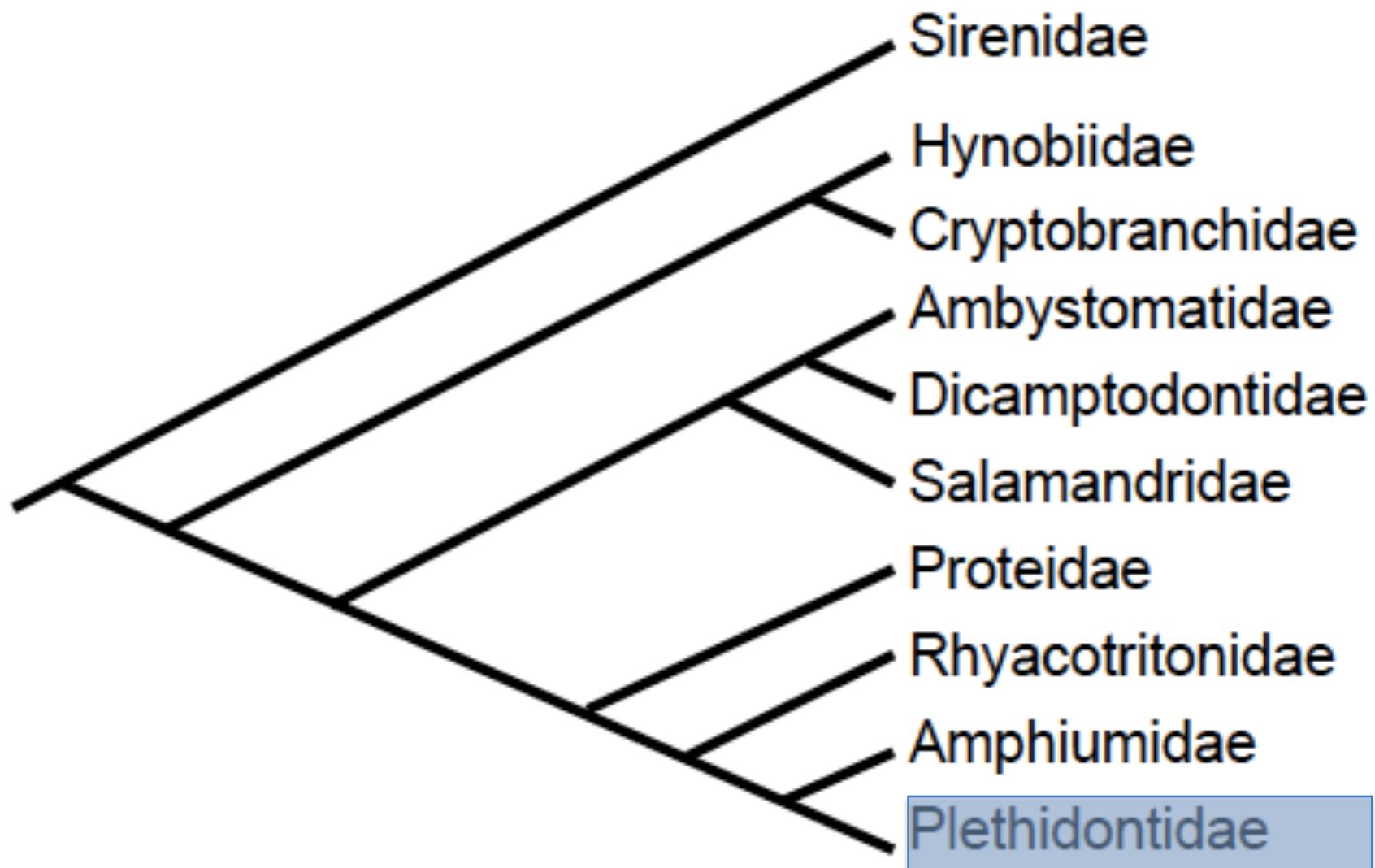
1 Genus, 3 Species



- Aquatic and eel-like
- PAEDOMORPHIC CHARACTERS:
 - NO eyelids
 - Gill Slits
 - 4 REDUCED LIMBS
 - Reduced toes (3, 2, or 1)
 - Lateral Line



Caudata tree





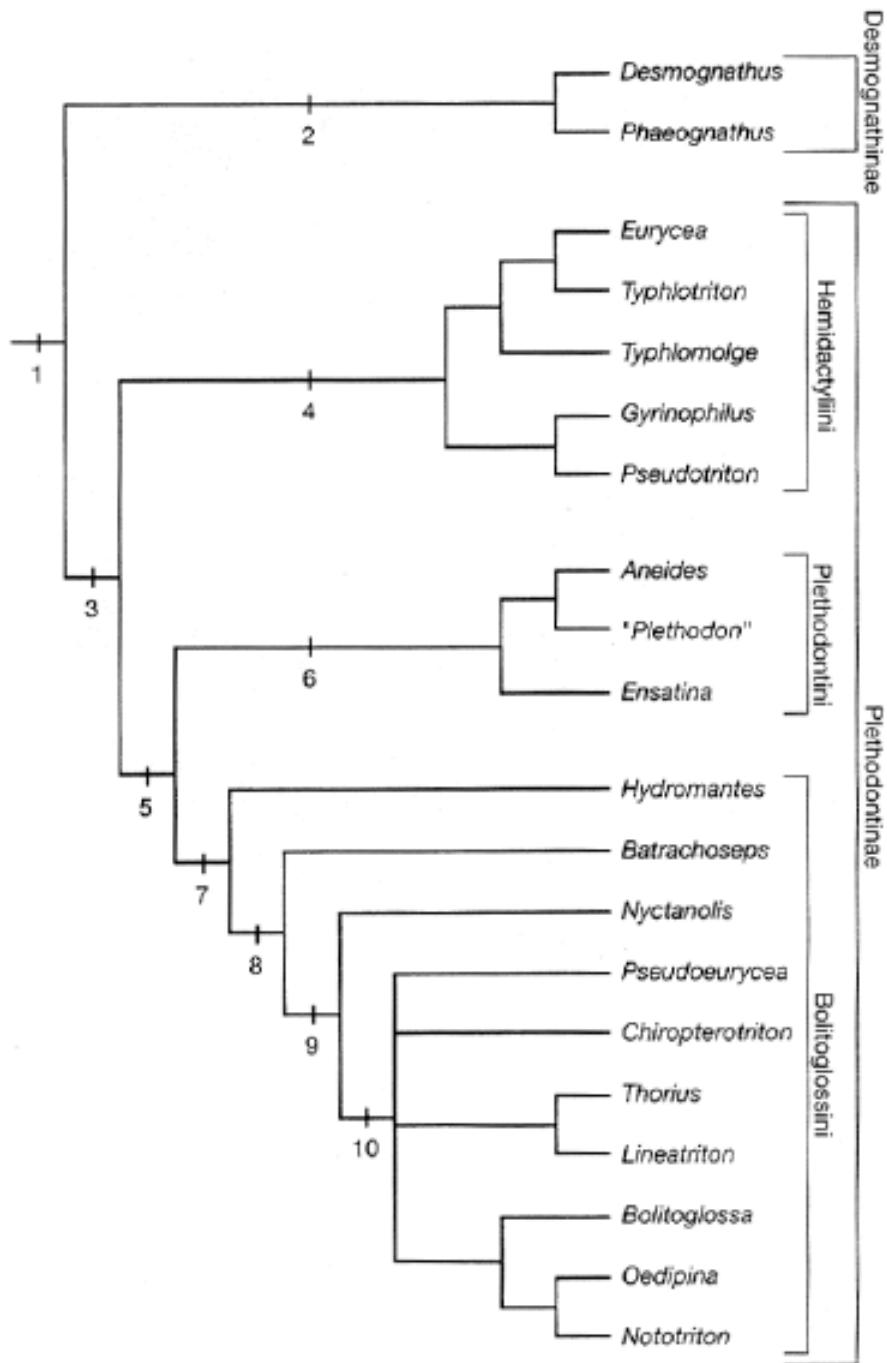
Lungless Salamanders

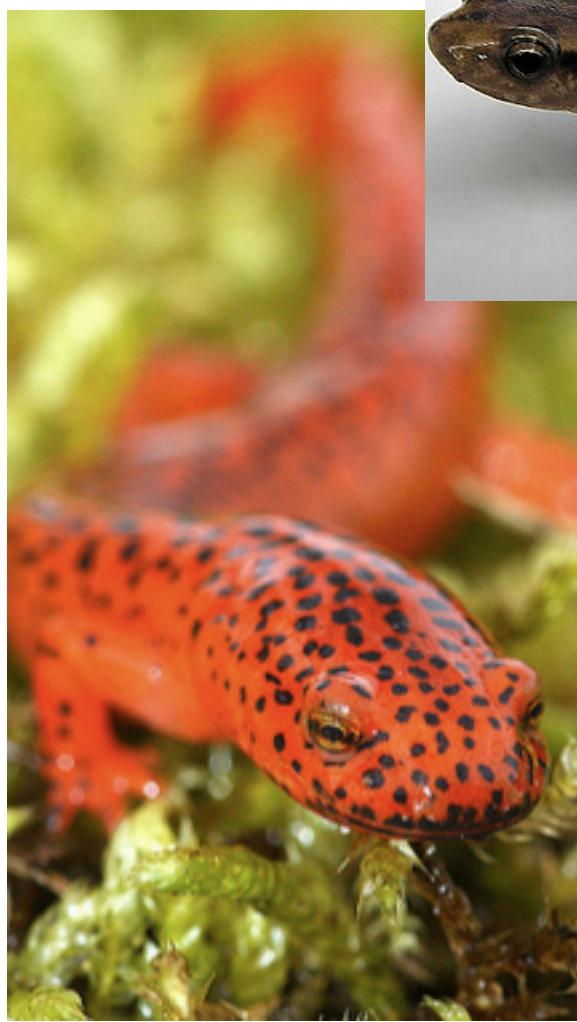
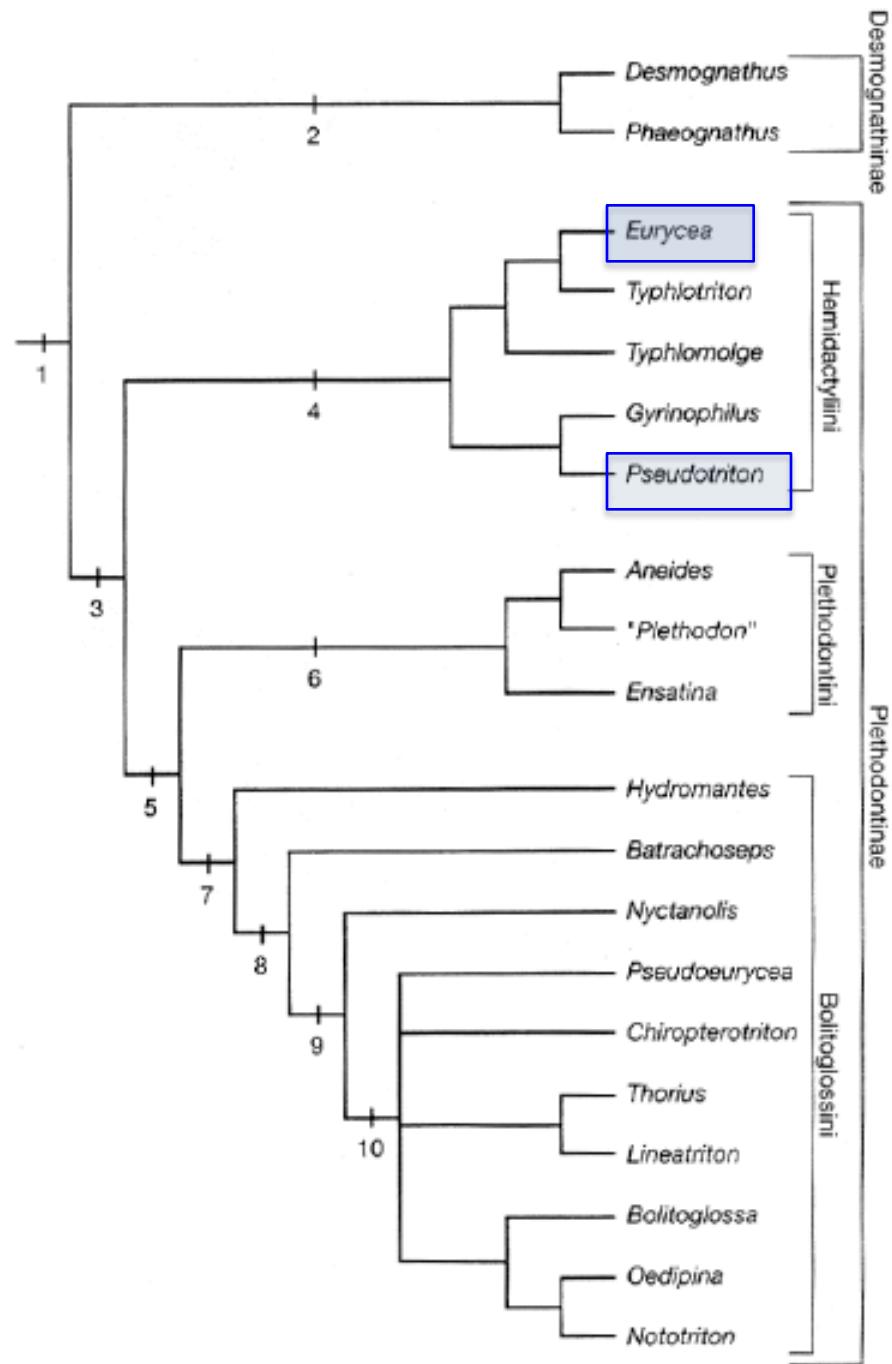
Clade: Plethodontidae

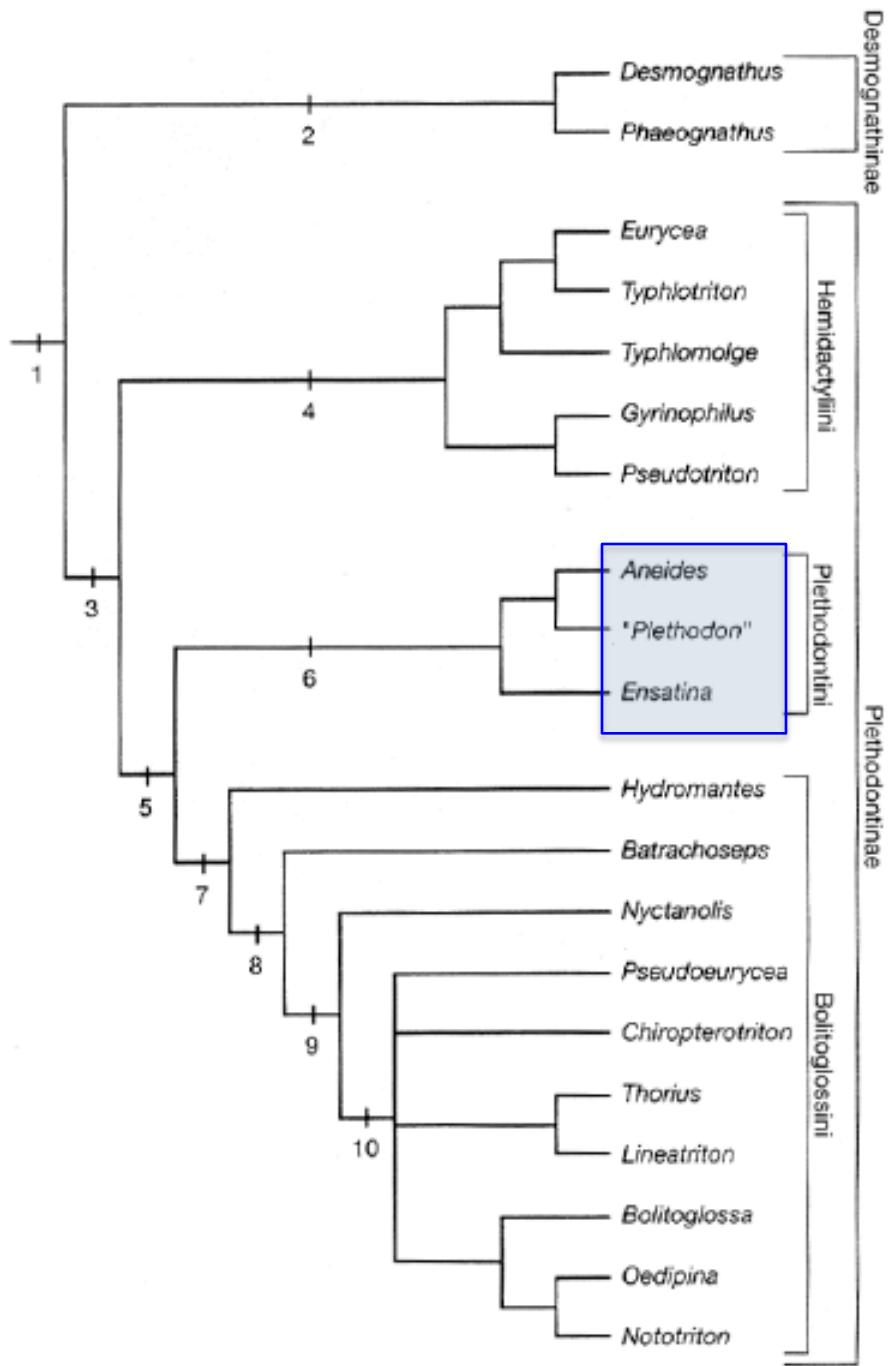
26 Genera, 443 Species

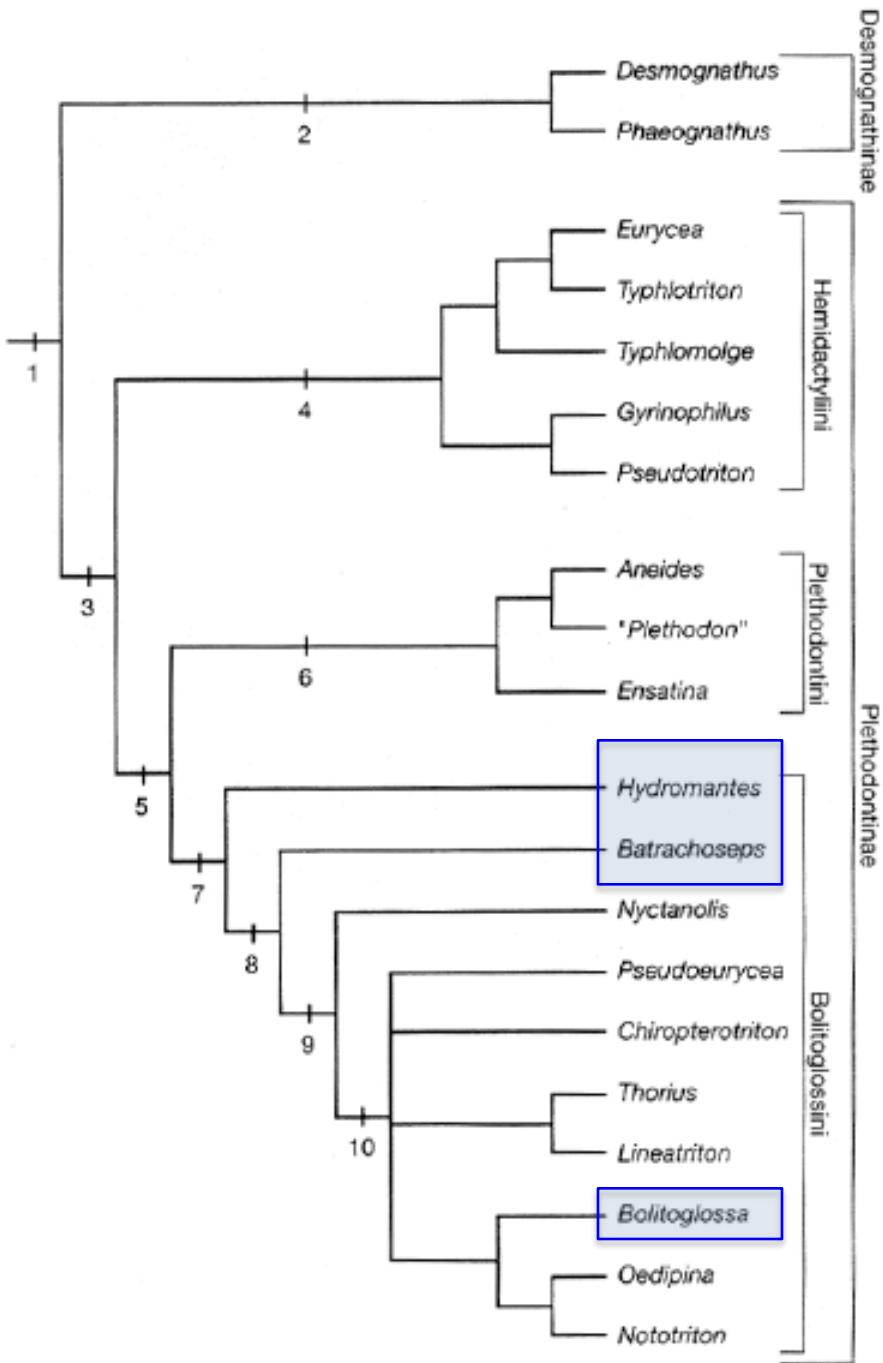


- **LUNLESS**
- Nasolabial grooves
- Modified hyoid – tongue projection
- 4 fingers, 5 toes (may be reduced)









Tribe: Bolitoglossini

Bolitoglossa sp.

